## We claim:

- 1. A mutagenic oligonucleotide for sitedirected mutagenesis of a double-stranded nucleic acid molecule comprising a mutagen incorporated into a single-stranded oligonucleotide having a sequence that forms a triple-stranded nucleic acid molecule with a target region of the doublestranded nucleic acid molecule.
- 2. The mutagenic oligonuclectide of claim 1 wherein the mutagen is selected from the group consisting of psoralen, acridine orange, an alkylating agent, a cis-platinum analog, a hematoporphyrin, a hematoporphyrin derivative, mitomycin C, a radionuclide, and a molecule that interacts with radiation to become mutagenic.
- 3. The mutagenic of igonucleotide of claim 1 wherein the mutagen causes a mutation in the double-stranded nucleic acid molecule in the presence of light.
- 4. The mutagenic oligonucleotide of claim 3 wherein the mutagenic chemical is 4'hydroxymethyl-4,5',8-trimethylpsoralen.
- 5. The mutagenic oligonucleotide of claim 1 wherein the oligonucleotide has a length of between 7 and 30 nucleotide bases.
- 6. A method for site-directed mutagenesis of a nucleic acid molecule comprising the steps of:
- a) hybridizing a mutagenic oligonucleotide to a target region of a double-stranded nucleic acid molecule, wherein the mutagenic oligonucleotide comprises a mutagen incorporated into a single-stranded nucleic acid that forms a

triple-stranded nucleic acid molecule with the target region; and

- b) mutating the double-stranded nucleic acid molecule.
- 7. The method of claim 6 comprising the additional step of activating the mutagen prior to the mutation step.
- 8. The method of claim 6 wherein the mutagen is selected from the group consisting of psoralen and acridine orange and is activated by light.
- 9. The method of claim 6 wherein the mutagen is selected from the group consisting of acridine orange, an alkylating agent, a cis-platinum analog, a hematoporphyrin, a hematoporphyrin derivative, mitomycin C, a radionuclide, and a molecule that interacts with radiation to become mutagenic.
- 10. The method of claim 6 wherein the mutation alters the activity of the double-stranded nucleic acid molecule.
- 11. The method of claim 6 wherein the double-stranded nucleic acid molecule is a gene.
- 12. The method of claim 6 wherein the gene is an oncogene.
- 13. The method of claim 6 wherein the gene is a defective gene.
- 14. The method of claim 6 wherein the double-stranded nucleic acid molecule is all or a portion of a viral genome.

- 15. A method of producing a mutagenic oligonucleotide comprising the steps of:
- a) synthesizing an oligonucleotide substantially complementary to a target region of a double-stranded nucleic acid molecule; and
- b) incorporating a mutagen in the oligonucleotide.
- 16. The method of claim 15 wherein the mutagen is covalently linked to the oligonucleotide.
- 17. The method of claim 15 wherein the mutagen is incorporated into the oligonucleotide during synthesis of the oligonucleotide.
- 18. The method of claim 15 wherein the mutagen is bound to the digonucleotide by photoactivation.
- 19. The method of claim 18 wherein the mutagen is selected from the group consisting of psoralen, acridine orange, an alkylating agent, a cisplatinum analog, a hematoporphyrin, a hematoporphyrin derivative, mitomycin C, a radionuclide and a molecule that interacts with radiation to become mutagenic.